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EVALUATION OF MACULAR GANGLION CELL COMPLEX USING SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN GLAUCOMA SUSPECT PATIENTS AND TO CORRELATE IT WITH NORMAL POPULATION

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ABSTRACT

PURPOSE: To evaluate macular ganglion cell complex in glaucoma suspect patients and normal population

RESULTS: The difference between values of neuroretinal rim thickness,rim area,disc area,average CDR,vertical CDR and cup volume among glaucoma suspect and normal (controls) was found to be statistically significant (p value<0.001).
The difference between values of superior, nasal, inferior, temporal and average RNFL thickness among glaucoma suspect and normal (controls) was found to be statistically significant(p value<0.001).
The difference between values of superotemporal,superior,superonasal,inferonasal,inferior,inferotemporal,average and minimum GCIPL(Ganglion cell Inner plexiform layer) thickness in µm,as estimated on OCT macula, was found to be statistically significant among glaucoma suspect patients and normal (controls) (p value <0.001).
Upon applying Spearman's rho correlation coefficient test in glaucoma suspect patients for GCIPL thickness and RNFL thickness, statistically significant correlation was found between Inferior RNFL thickness with Inferotemporal GCIPL thickness(p value 0.029) and Temporal RNFL thickness with Inferotemporal GCIPL thickness .(p values 0.006).
Upon applying Spearman's rho correlation coefficient test in normal (controls) for GCIPL thickness and RNFL thickness,statistically significant correlation was found between Superior RNFL thickness with Superior GCIPL thickness(p value 0.038), Superior RNFL thickness with Superonasal GCIPL thickness (p values 0.012), and Average RNFL thickness with Average GCIPL thickness (p value 0.033)

CONCLUSION:
In our study we found there is statistically significant reduction in thickness in all measured quadrants of Macular GCIPL and RNFL in glaucoma suspect patients compared to normal. Also, a statistically significant correlation was found between Inferior RNFL thickness with Inferotemporal GCIPL thickness and Temporal RNFL thickness with Inferotemporal GCIPL thickness in glaucoma suspect patients,suggesting good diagnostic ability of inferotemporal macular GCIPL thickness.

KEYWORDS: Glaucoma, OCT, RNFL, Macular GCLIPL Thickness

INTRODUCTION

Glaucoma is a multifactorial progressive optic neuropathy which is characterized by a loss of retinal ganglion cells (RGCs) with subsequent loss of nerve fibers resulting in functional visual impairment.[1]It is associated with intraocular pressure (IOP)-related damage to the optic nerve, which results in the reduction/ loss of retinal ganglion cells [2].

Glaucoma is the leading cause of irreversible blindness in the world and is associated with a reduced quality of life [3]. An estimated 57.5 million people worldwide are affected by POAG with a global prevalence of 2.2% [4] In India, glaucoma accounts for 12% of blindness and 11.4% of low vision[5] Primary open-angle glaucoma (POAG) is largely asymptomatic in its early stages, and this is one of the main reasons why prevention and treatment of glaucoma-associated progressive-vision-loss has been a major hurdle.

Early diagnosis and appropriate treatment can slow down the disease progression and preserve patients useful vision. Thus,

the ability to diagnose glaucoma early and detect its progression sensitively is thus very important for disease management.
Optical coherence tomography (OCT) has been widely used in ophthalmology over the past 2 decades. In clinical practice, OCT allows in vivo quantitative assessment of the peripapillary retinal nerve fiber layer (RNFL) and the optic nerve head (ONH) parameters with precision and good reproducibility, which is proved to be particularly valuable in glaucoma detection, staging, and monitoring.[6,7] Spectral-domain (SD)-OCT has resolution power up to 5 μ in measuring the average RNFL thickness, offering a marked advantage in the early detection of glaucoma and in the objective assessment of progression of glaucomatous damage.[8]

The human retina contains more than 1 million retinal ganglion cells (RGCs), approximately 50% of which are concentrated in the foveal centre.[9] Previous studies have confirmed that structural changes of glaucoma primarily affect RGC and their axons.[10,11] Theoretically, it is easier to detect the loss of RGC counts in the macular region because of the high density in this region. The development of spectral-domain OCT (SD-OCT) enables the measurement of macular ganglion cell complex (GCC) thickness which is defined as the sum of RNFL, ganglion cell layer (GCL), and inner plexiform layer (IPL) thickness.[12,13]

To date, the diagnosis of glaucoma in very early stages and recognition of its subtle progression still remains a challenging task. Thus, the purpose of this study includes early detection of the macular GCC thickness changes in glaucoma suspect patients.

AIMS AND OBJECTIVE

To evaluate macular ganglion cell complex in glaucoma suspect patients and normal population.

1. To analyse diagnostic ability of Ganglion cell complex (GCC) thickness to detect early glaucoma
2. To correlate macular ganglion cell complex with OCT Optic nerve head (ONH) and Retinal nerve fiber layer (RNFL) thickness

MATERIALS AND METHODS

We performed a prospective cross sectional observational study on 150 eyes of subjects, including 2 groups. The first group consisted of 75 eyes of glaucoma suspect patients, whereas second group consisted of 75 eyes of normal population, which were taken as controls.

Data Acquisition:

Inclusion criteria for glaucoma suspect eyes were as follows:

1. Age >18 years (Cooperative patients) And patients willing to undergo OCT and other examinations
2. Patients with Ocular hypertension(OHT) (When Intraocular pressure(IOP) is >22 mmhg on 3 consecutive examinations with open angles and no disc/Visual field changes) and having diurnal IOP variation
3. Patients with glaucoma suspect disc,which includes Large optic cup(>0.4 Cup to disc ratio), Disc hemorrhage, Asymmetrical cup(Cup to disc ratio difference of atleast 0.2 in both eyes) Nasal displacement of vessels, Baring of circumlinear vessels, Narrowing/notching of rim, Tortuosity of retinal vessels on the disc, Vertical elongation of cup
4. Refratctive errors upto +4 D to -6 D
5. Associated risk factors like strong family history of glaucoma
6. Normal Visual field/No visual field changes

Exclusion criteria for glaucoma suspects included :

1. Any other posterior segment pathology (Diabetic retinopathy, Hypertensive retinopathy, Retinal Degenerations etc), Previous Panretinal photocoagulation
2. Presence of significant cataract or any other media opacity that can preclude performance of Visual field perimetry or OCT
3. History of any past Cerebrovascular accident or acelerated Hypertension (To rule out microvasculopathy induced Optic nerve damage)
4. Myopia >-6 D (High myope) wih peripapillary atrophy/ tilted disc changes
5. Neurosurgical conditions such as space-occupying lesions
6. History of Uveitis, choroiditis or any other inflammatory eye conditions, past history of complicated eye surgeries
7. Systemic diseases having ocular manifestations (for example Rhematoid arthritis, Neurofibomatosis, Wilsons disease, Hyperthyroidism etc.)
8. Primary angle closure suspect (PACS)
9. Visual field defects suggestive of glaucoma

For normal population exclusion criteria was as follows :

10. History of chronic ocular disease(Uveitis,choriditis etc)
11. Systemic diseases with ocular manifestations (for example Rheumatoid Arthritis, Neurofibomatosis Wilsons disease, Hyperthyroid)
12. Systemic or Topical Corticosteroid use
13. Past History of ocular surgery(within 3 months), ocular trauma
14. High myopes and hypermetropes (-6D to +4D)

Detailed history was obtained of all patient subjects.

All subjects underwent comprehensive ophthalmological evaluation including visual acuity, intraocular Pressure measurement with Goldmann's applanation tonometer, visual field perimetry (24-2) by humphrey's perimeter, slit lamp examination, gonioscopy, central corneal thickness(CCT), fundus evaluation with indirect ophthalmoscope and slit lamp biomicroscopy by 90D lens. Macular OCT (Optic nerve head and retinal nerve fiber layer OCT) was obtained on Cirrus HD-OCT.

Statistical Analysis:

Qualitative data was represented in form of frequency and percentage.

Among Qualitative data, Nominal data included Groups (Glaucoma suspect & Normal), Sex of the cases and Anterior chamber depth (van Herick method).

Association between qualitative variables was assessed by Chi-

Square test, with Continuity Correction for all 2 X 2 tables (E.g. Association between Groups (Glaucoma suspect & Normal) and Sex of the cases).

Quantitative data was represented using Mean ± SD and Median & IQR (Interquartile range).
Quantitative data included age, Decimal notation, Disc ratio, Corrected IOP with Applanation tonometer (mmHg), OCT ONH (Neuroretinal rim thickness, Rim Area, Disc area, Average, etc.), RNFL Thickness (µm) (Superior, Nasal, Inferior, Temporal, Average) and OCT Macula GCIPL Thickness (µm) (Superotemporal,Superior, Superonasal, Inferonasal, Inferior,Inferotemporal,Average and Minimum)

Comparison of Quantitative data measured between binomial qualitative variable (Groups (Glaucoma suspect & Normal)) was done using Unpaired t-test, if the data passed 'Shapiro–Wilk test Normality test' or by Mann–Whitney U test if the data failed 'Normality' test. (E.g. Comparison of age between Groups (Glaucoma suspect & Normal)

Within group correlation between Quantitative data was done by using Spearman's rank correlation, as all data failed 'Shapiro–Wilk test Normality' test. (E.g., Nonparametric Correlation between OCT Macula GCIPL Thickness-Superior & RNFL Thickness-Superior in Glaucoma suspects).

Results was graphically represented where deemed necessary.
Appropriate statistical software, including but not restricted to MS Excel, PSPP version 1.0.1 was used for statistical analysis. Graphical representation was done in MS Excel package included in Microsoft Office 365. An alpha value (p-value) of <=0.05 was used as the cut-off for statistical significance.

OBSERVATION AND RESULTS

The study was conducted in department of Ophthalmology at a tertiary care hospital.75 eyes of patients with a clinical diagnosis of glaucoma suspect and 75 eyes of age,sex and BCVA matched controls were included in the study. The various tests described in materials and methodology were applied for all the patients and the results are as follows:

Variables	Glaucoma suspect	Normal population
Eyes	75	75
Sex(male : female)	39 : 36	39 : 36
Age (years) ±SD years	56.21 ± 11.04	56.21 ± 11.04
Visual acuity ± SD, log MAR	0.83 ± 0.17	0.84 ± 0.17
Corrected intraocular pressure ± SD mmHg	21.97 ± 3.77	16.45 ± 2.32
Central corneal thickness (µ)	530.95±23.3	527.73±18.45
Optic Cup:Disc ratio by slit lamp biomicroscopy	0.49±0.16	0.27±0.06

Table 1: Demographic and clinical characteristics of glaucoma suspect and control groups

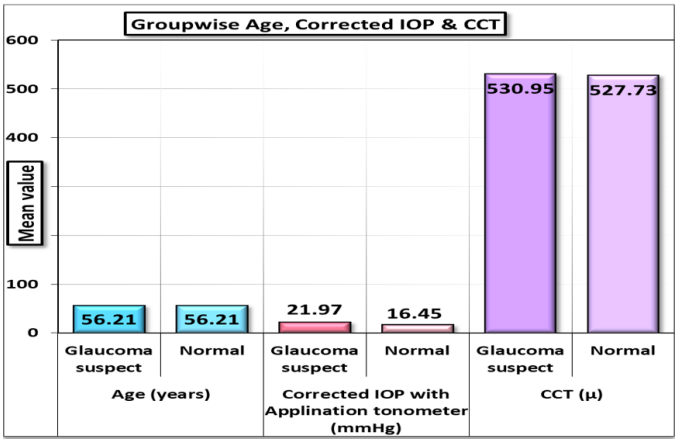

Figure 1

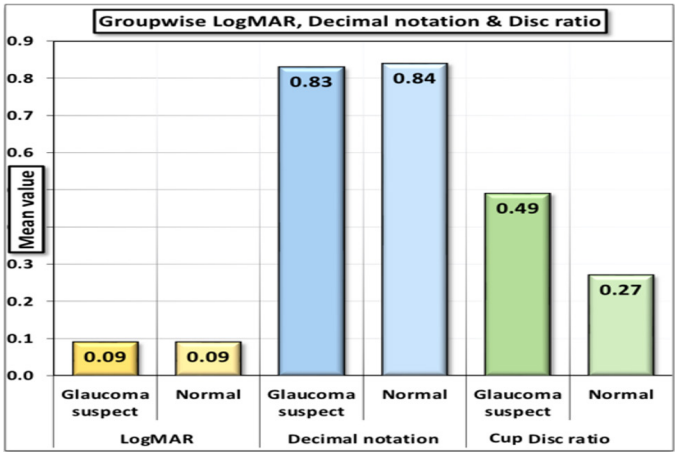

Figure 2

The difference between values of cup disc ratio (CDR) and corrected IOP(Intraocular pressure) among glaucoma suspect and normal (controls) was found to be statistically significant(p value 7.98E-18 and 2.63E-15 respectively, which is <0.001).

OCT ONH Variables	Groups	Mean	SD	Median	IQR	Z-value	p-value
OCT ONH-Neuroretinal rim thickness (µm)	Glaucoma suspect	275.95	18.02	275.00	26.00	-10.511	7.70E-26
	Normal	361.97	23.41	361.00	35.00	Difference is significant	
OCT ONH-Rim Area (mm2)	Glaucoma suspect	1.17	0.13	1.16	.18	-6.989	2.76E-12
	Normal	1.37	0.15	1.39	0.10	Difference is significant	
OCT ONH-Disc area (mm2)	Glaucoma suspect	2.36	0.21	2.42	0.42	-6.529	6.63E-11
	Normal	2.12	0.14	2.10	0.22	Difference is significant	
OCT ONH-Average CDR	Glaucoma suspect	0.54	0.15	0.52	0.29	-9.753	1.78E-22
	Normal	0.32	0.05	0.32	0.05	Difference is significant	

OCT ONH-Vertical CDR	Glaucoma suspect	0.50	0.15	0.48	0.29	-9.905	3.96E-23
	Normal	0.28	0.05	0.28	0.06	Difference is significant	
OCT ONH-Cup Volume (mm3)	Glaucoma suspect	0.36	0.06	0.35	0.10	-9.529	1.58E-21
	Normal	0.24	0.04	0.25	0.06	Difference is significant	

Table 2: Comparison of various OCT ONH variables between glaucoma suspect and normal subjects

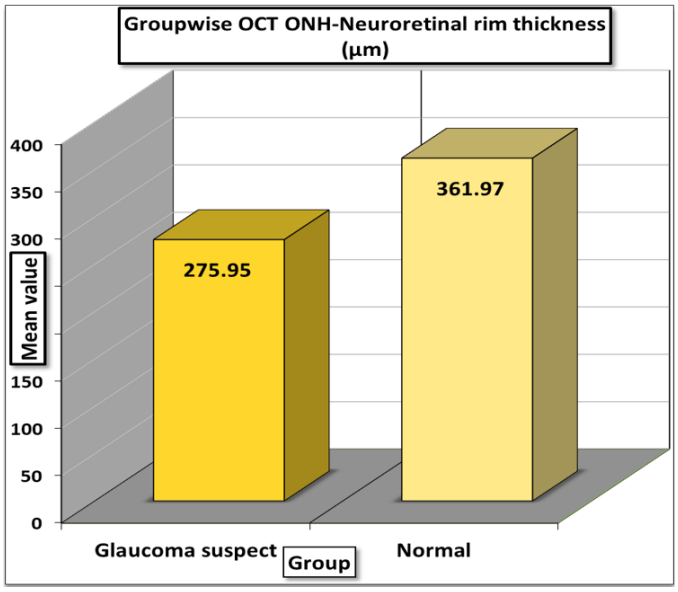

Figure 3

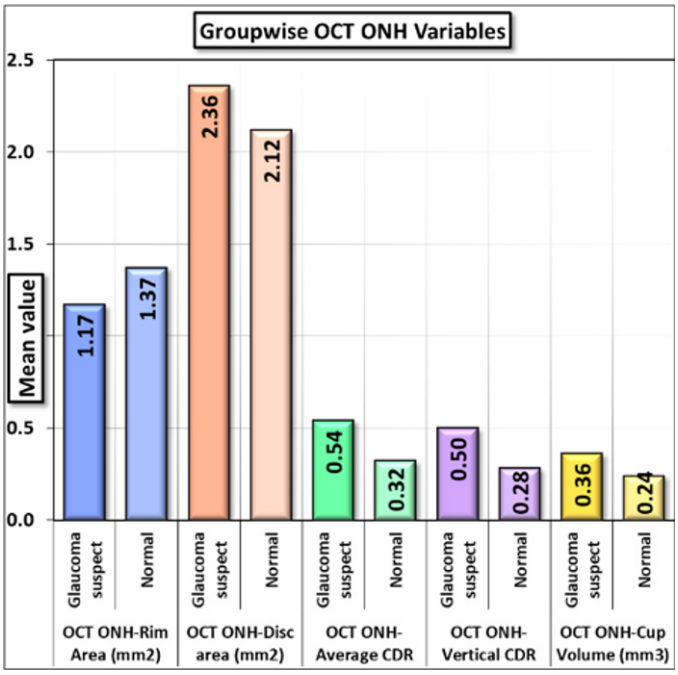

Figure 4

^ All data failed 'Normality' test. Hence Mann-Whitney test applied.

The difference between values of neuroretinal rim thickness,rim area,disc area,average CDR,vertical CDR and cup volume among glaucoma suspect and normal (controls) was found to be statistically significant (p value<0.001).

RNFL Thickness (µm) Variables ^	Groups	Mean	SD	Median	IQR	Z-value	p-value
RNFL Thickness (µm)-Superior	Glaucoma suspect	104.59	7.37	104.00	10.00	-5.598	2.17E-08
	Normal	112.52	8.35	110.00	13.00	Difference is significant	
RNFL Thickness (µm)-Nasal	Glaucoma suspect	66.40	4.96	66.00	7.00	-6.164	7.10E-10
	Normal	72.56	5.35	71.00	6.00	Difference is significant	
RNFL Thickness (µm)-Inferior	Glaucoma suspect	108.52	7.60	107.00	8.00	-6.582	4.66E-11
	Normal	117.85	8.10	116.00	12.00	Difference is significant	
RNFL Thickness (µm)-Temporal	Glaucoma suspect	63.73	4.93	64.00	8.00	-6.121	9.29E-10
	Normal	69.60	5.16	69.00	6.00	Difference is significant	
RNFL Thickness (µm)-Average	Glaucoma suspect	85.81	5.62	85.50	7.25	-6.819	9.15E-12
		93.15	5.98	91.00	8.00	Difference is significant	

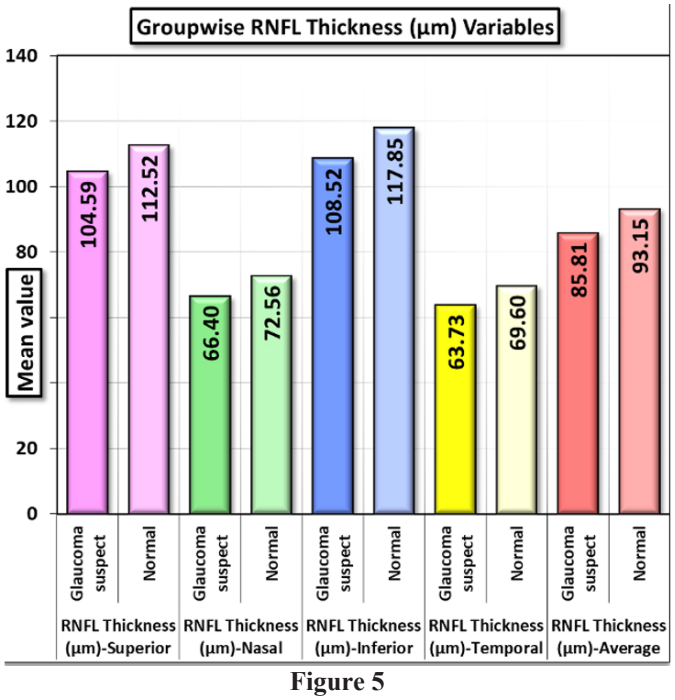

Figure 5

^ All data failed 'Normality' test. Hence Mann-Whitney test applied.

The difference between values of superior, nasal, inferior, temporal and average RNFL thickness among glaucoma suspect

and normal (controls) was found to be statistically significant (p value<0.001).

OCT Macula GCIPL Thickness (µm) Variables	Groups	Mean	SD	Median	IQR	Z-value	p-value
OCT Macula GCIPL Thickness (µm)-Superotemporal	Glaucoma suspect	79.93	1.51	80.00	2.00	-9.982	1.83E-23
	Normal	84.07	1.58	84.00	2.00	Difference is significant	
OCT Macula GCIPL Thickness (µm)-Superior	Glaucoma suspect	80.08	1.52	80.00	2.00	-9.948	2.58E-23
	Normal	84.12	1.67	84.00	2.00	Difference is significant	
OCT Macula GCIPL Thickness (µm)-Superonasal	Glaucoma suspect	80.05	1.52	80.00	2.00	-9.530	1.57E-21
	Normal	83.76	1.74	84.00	2.00	Difference is significant	
OCT Macula GCIPL Thickness (µm)-Inferonasal	Glaucoma suspect	78.57	1.34	78.00	2.00	-9.337	9.89E-21
	Normal	81.88	1.72	82.00	2.00	Difference is significant	
OCT Macula GCIPL Thickness (µm)-Inferior	Glaucoma suspect	78.25	1.53	78.00	2.00	-9.484	2.44E-21
	Normal	81.79	1.49	82.00	2.00	Difference is significant	
OCT Macula GCIPL Thickness (µm)-Inferotemporal	Glaucoma suspect	78.40	1.45	78.00	2.00	-9.054	1.37E-19
	Normal	81.65	1.60	82.00	2.00	Difference is significant	
OCT Macula GCIPL Thickness (µm)-Average	Glaucoma suspect	79.38	1.21	79.40	2.00	-17.432	1.07E-37
	Normal	83.13	1.42	83.20	1.60	Difference is significant	
OCT Macula GCIPL Thickness (µm)-Minimum	Glaucoma suspect	76.79	1.29	77.00	1.00	-9.359	8.08E-21
	Normal	79.92	1.38	80.00	2.00	Difference is significant	

Table 4: Comparison of various OCT Macula GCIPL Thickness (µm) variables between Glaucoma suspect and Normal subjects

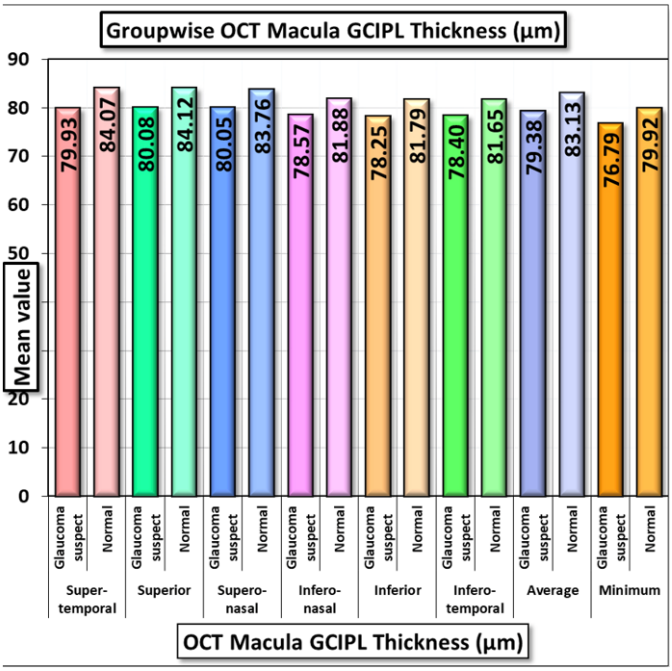

Figure 6

Unpaired T-test applied.Rest all data failed 'Normality' test.Hence Mann-Whitney test applied.

The difference between values of superotemporal, superior, superonasal, inferonasal, inferior, inferotemporal, average and minimum GCIPL(Ganglion cell Inner plexiform layer) thickness in µm, as estimated on OCT macula, was found to be statistically significant among glaucoma suspect patients and normal (controls) (p value <0.001).

Variables	Spearman's rho	RNFL Thickness (µm)-Superior	RNFL Thickness (µm)-Nasal	RNFL Thickness (µm)-Inferior	RNFL Thickness (µm)-Temporal	RNFL Thickness (µm)-Average
OCT Macula GCIPL Thickness (µm)-Superotemporal	Correlation Coefficient	0.119	0.137	0.129	0.108	0.148
	P-value	0.310	0.241	0.272	0.354	0.205
OCT Macula GCIPL Thickness (µm)-Superior	Correlation Coefficient	0.188	0.212	0.174	0.196	0.243
	P-value	0.106	0.068	0.136	0.092	0.036
OCT Macula GCIPL Thickness (µm)-Superonasal	Correlation Coefficient	0.114	0.138	0.133	0.160	0.177
	P-value	0.329	0.239	0.257	0.171	0.128

OCT Macula GCIPL Thickness (µm)-Inferonasal	Correlation Coefficient	0.095	0.080	0.128	0.093	0.142
	P-value	0.417	0.497	0.272	0.426	0.224
OCT Macula GCIPL Thickness (µm)-Inferior	Correlation Coefficient	0.102	0.161	0.128	0.179	0.164
	P-value	0.382	0.169	0.275	0.124	0.159
OCT Macula GCIPL Thickness (µm)-Inferotemporal	Correlation Coefficient	0.197	0.322	0.252	0.315	0.326
	P-value	0.091	0.005	0.029	0.006	0.004
OCT Macula GCIPL Thickness (µm)-Average	Correlation Coefficient	0.160	0.172	0.179	0.179	0.216
	P-value	0.170	0.139	0.124	0.124	0.063
OCT Macula GCIPL Thickness (µm)-Minimum	Correlation Coefficient	-0.076	0.060	-0.026	0.07	0.016
	P-value	0.516	0.606	0.827	0.553	0.893

Table 5:Nonparametric Correlation between OCT Macula GCIPL Thickness & RNFL thickness in glaucoma suspects

Upon applying Spearman's rho correlation coefficient test in glaucoma suspect patients for GCIPL thickness and RNFL thickness, statistically significant correlation was found between Inferior RNFL thickness with Inferotemporal GCIPL thickness(p value 0.029) and Temporal RNFL thickness with Inferotemporal GCIPL thickness .(p values 0.006).

Variables	Spearman's rho	RNFL Thickness (µm)-Superior	RNFL Thickness (µm)-Nasal	RNFL Thickness (µm)-Inferior	RNFL Thickness (µm)-Temporal	RNFL Thickness (µm)-Average
OCT Macula GCIPL Thickness(µm)-Supertemporal	Correlation Coefficient	0.080	0.089	0.107	0.035	0.08
	P-value	0.497	0.446	0.362	0.763	0.493
OCT Macula GCIPL Thickness(µm)-Superior	Correlation Coefficient	0.240	0.304	0.293	0.21	0.285
	P-value	0.038	0.008	0.011	0.071	0.013
OCT Macula GCIPL Thickness(µm)-Superonasal	Correlation Coefficient	0.287	0.326	0.343	0.255	0.322
	P-value	0.012	0.004	0.003	0.027	0.005
OCT Macula GCIPL Thickness(µm)-Inferonasal	Correlation Coefficient	0.175	0.175	0.221	0.149	0.199
	P-value	0.132	0.132	0.057	0.203	0.087
OCT Macula GCIPL Thickness (µm)-Inferior	Correlation Coefficient	0.136	0.142	0.17	0.106	0.148
	P-value	0.244	0.223	0.144	0.365	0.206
OCT Macula GCIPL Thickness (µm)-Inferotemporal	Correlation Coefficient	0.114	0.134	0.155	0.062	0.113
	P-value	0.329	0.25	0.186	0.598	0.336
OCT Macula GCIPL Thickness (µm)-Average	Correlation Coefficient	0.212	0.252	0.263	0.179	0.246
	P-value	0.068	0.029	0.022	0.124	0.033
OCT Macula GCIPL Thickness (µm)-Minimum	Correlation Coefficient	0.028	0.189	0.127	0.113	0.097
	P-value	0.814	0.105	0.277	0.334	0.407

Table 6: Nonparametric Correlation between OCT Macula GCIPL Thickness & RNFL thickness in normal subjects

Upon applying Spearman's rho correlation coefficient test in normal (controls) for GCIPL thickness and RNFL thickness, statistically significant correlation was found between Superior RNFL thickness with Superior GCIPL thickness(p value 0.038), Superior RNFL thickness with Superonasal GCIPL thickness (p values 0.012), and Average RNFL thickness with Average GCIPL thickness (p value 0.033)

DISCUSSION

In our cross-sectional observational study using SD-OCT(Spectral Domain Optical Coherence Tomography), macular GCIPL(Ganglion cell-Inner plexiform layer)and

RNFL(Retinal Nerve Fiber Layer) thickness values were obtained in glaucoma suspect patients group and in age-sex and BCVA matched normal group(controls).

In our study, a statistically significant reduction in the values of some parameters of OCT ONH, such as neuroretinal rim thickness and rim area were noticed in glaucoma suspect group than that of controls. Also, statistically significant increment in glaucoma suspect group was noted in other parameters of OCT ONH such as disc area, average CDR, vertical CDR, and cup volume.

We also noted a statistically significant reduction in RNFL and macular GCIPL thickness in all measured quadrants in glaucoma suspect group than that in normal (controls).

In our study, a statistically significant correlation was noted between the inferior and temporal RNFL thickness with inferotemporal GCIPL thickness in glaucoma suspect group.

Also, a statistically significant increase in CDR and corrected IOP in glaucoma suspect group was noted during our study.

According to our study ,the decrease in macular GCIPL thickness measured by OCT macula in various quadrants can be associated with glaucoma suspect patients.

Comparison of various OCT ONH variables between Glaucoma suspect and Normal subjects (Table 2)

Our study was suggestive of association of lower, neuroretinal rim thickness and rim area and higher disc area, average CDR, vertical CDR and cup volume with glaucoma suspects, similar to the study done by Tzu-Yang et Al.(14) ,where PPG(preperimetric group) showed statistically significant reduction in neuroretinal rim thickness and rim area and statistically significant increment in disc area, average CDR ,vertical CDR and cup volume than normal group, resembling the outcome of our study.

Comparison of various RNFL Thickness (µm) variables between Glaucoma suspect and Normal subjects(Table 3)

Our study was suggestive of association of lower values of superior, nasal, inferior, temporal and average RNFL thickness with glaucoma suspects than normal controls. In study done by Xiaoyu Xu et Al(15) value of superior, nasal, inferior, temporal and average RNFL thickness showed which showed statistically significant reduction in OHT and glaucoma group, resembling our study.

Comparison of various OCT Macula GCIPL Thickness (µm) variables between Glaucoma suspect and Normal subjects (Table 4)

Our study was suggestive of association of lower values of superotemporal, superior, superonasal, inferonasal, inferior, inferotemporal, average and minimum GCIPL thickness with glaucoma suspects than normal controls.In study done by by Xiaoyu Xu et Al(15) value of superotemporal, superior, superonasal, inferonasal, inferior, inferotemporal, average and minimum GCIPL thickness showed significant reduction in OHT and glaucoma group, resembling our study. Also, study done by Meri-ju chen et Al.(16) showed statistically significant reduction in values of superotemporal, superior, superonasal, inferonasal, inferior, inferotemporal ,average and minimum GCIPL thickness in PPG(preperimetric glaucoma group),resembling the outcome of our study.

Nonparametric Correlation between OCT Macula GCIPL Thickness & RNFL Thickness in Glaucoma suspects(Table 5)

In our study, Upon applying Spearman's rho correlation coefficient test in glaucoma suspect patients for GCIPL thickness and RNFL thickness, statistically significant correlation was found between Inferior RNFL thickness with Inferotemporal GCIPL thickness(p value 0.029) and Temporal RNFL thickness with Inferotemporal GCIPL thickness .(p values 0.006).

In study done by Xiaoyu Xu et Al(15) on Pearson correlation coefficients between GCIPL and RNFL thickness parameters, there was statistically significant correlation between thickness of average GCIPL and average RNFL, superior GCIPL and superior RNFL, and inferior GCIPL and inferior RNFL respectively, in glaucomatous eyes .

Nonparametric Correlation between OCT Macula GCIPL Thickness & RNFL Thickness in Normal Subjects(Table 6)

Upon applying Spearman's rho correlation coefficient test in normal (controls) for GCIPL thickness and RNFL thickness, statistically significant correlation was found between Superior RNFL thickness with Superior GCIPL thickness(p value 0.038), Superior RNFL thickness with Superonasal GCIPL thickness (p values 0.012), and Average RNFL thickness with Average GCIPL thickness (p value 0.033).

CONCLUSION

Glaucoma is a chronic, progressive optic neuropathy which can lead to irreversible loss of visual function if not treated. If early diagnosis is done and treatment started as early as possible, the quality of vision and quality of life of patient can be saved from damage much earlier.

In our cross sectional observational study, we evaluated Macular GCIPL thickness and RNFL thickness in glaucoma suspect patients and compared them with age,sex and BCVA matched normal population. It was found in our study that there is statistically significant reduction in thickness in all measured quadrants of Macular GCIPL and RNFL in glaucoma suspect patients compared to normal. Also, a statistically significant correlation was found between Inferior RNFL thickness with Inferotemporal GCIPL thickness and Temporal RNFL thickness with Inferotemporal GCIPL thickness in glaucoma suspect patients, suggesting good diagnostic ability of inferotemporal macular GCIPL thickness.

Most of the earlier studies done on the evaluation of Macular GCIPL and RNFL thickness showed statistically significant reduction in Macular GCIPL and RNFL thickness in glaucoma

suspects. However, unlike our study, some these studies included group of already diagnosed glacouma patients, such as preperimetric, early, moderate or advanced glaucoma along with normal population and glaucoma suspect such as OHTs , whereas in our study, we only included glaucoma suspect patients (which included OHTs) and normal population, with one of the inclusion criteria being normal visual field in all the subjects in both groups.

The statistically significant reduction in macular GCIPL thickness in glaucoma suspects than that of normal, as measured by OCT, can be advantageous in detecting early glaucomas and prevent further damage. To achieve optimum result, both macular GCIPL and RNFL thickness can be evaluated on a periodic serial scans in glaucoma suspects and can be correlated with each other and with visual field for detecting progression of glaucoma. As our study was cross sectional in nature, in patients with decreased macular GCIPL thickness, the further progression of glaucoma can't be identified. Study can be done in higher population, with multiple follow ups and serial scans with visual field testing to detect the progression of glaucoma in glaucoma suspect patient

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